

Risk of Acute Ischemic Stroke in Covid-19 Patients

SALEHA ISLAM¹, AHMED EJAZ², AHMED AMMAD³, MUHAMMAD ABDULLAH ISLAM⁴, ASMA KANWAL⁵, RABIA ISLAM⁶

¹*PGR Medicine, Shahida Islam Teaching Hospital*

²*Medical Officer, Indus Hospital, Jubilee Town, Lahore*

³*Medical Officer ER Indus Hospital. Rashid Latif Medical College*

⁴*5th Year MBBS Student, United Medical and Dental College, Karachi*

⁵*Demonstrator, Rashid Latif Medical College, Lahore.*

⁶*Assistant Professor, Institute Of Public Health Lahore*

Corresponding author: Rabia Islam, Email: Drrabiaislam11@gmail.com

ABSTRACT

Objective: Research on large groups of COVID-19 patients in terms of risk factors for acute ischemic stroke, events that occur in the hospital, and outcome is lacking. Acute ischemic stroke frequency was determined in both COVID-19-positive and non-positive individuals. Those results were then compared to those of people who had an acute ischemic stroke but did not have COVID-19.

Methods: Based on the Cerner COVID-19 collection of de-identified data from 5 healthcare facilities, we were able to do our analysis in the Institute of Public Health Sciences Lahore. No patients were left out of the experiment because they had a COVID-19-related discharge diagnosis or a confirmed COVID-19 infection.

Results: Out of the 8163 people who took part in the COVID-19 study, 103 (1,3%) had an acute ischemic stroke. Risk factors for cardiovascular disease like high blood pressure and diabetes were found to be more common in people who had had an acute ischemic stroke than in the general population. After taking into account possible confounding factors, the risk of an acute ischemic stroke was found to be higher (relative risk: 2.0; 95 percent confidence interval (CI): 1.0–2.4; P<0.0001). Ischemic strokes happened to most of the people who didn't get COVID-19 in the first three months. After taking into account other important factors, COVID-19 was linked to a 1.2 (95 percent CI: 1.0–1.3) relative risk of death or discharge to a place other than home for all ischemic stroke patients (P = 0.03).

Conclusions: People in the COVID-19 cohort had a very low rate of acute ischemic stroke if they didn't have any other heart disease risks. In the COVID-19 study, people who had an acute ischemic stroke were twice as likely to have to go back to the hospital or die.

INTRODUCTION

The risk of an acute ischemic stroke goes up by a factor of between 3.2 and 7.8 if you have COVID-19. This is the same risk that other infections of the respiratory tract cause. According to a confidence interval (CI) with a 95% chance that doesn't take continuity correction into account, between 1% and 3% of COVID-19 patients will have an acute ischemic stroke while they are in the hospital getting treatment. 4 As of June 27, 2021, 9,988,254 people around the world had COVID-19, and between 21 and 31 percent of those who got sick had to go to the hospital⁵. It is expected that between 182,485 and 269,383 of the people who get COVID-19 will have a stroke caused by a blockage in the blood vessel. 6 Based on the findings of the following investigation, COVID-19^{7–12} people had an ischemic stroke. When d-dimer levels, erythrocyte sedimentation rate, lactate dehydrogenase, and lymphopenia are high, inflammation and blood clotting are caused. 8,13–16 A group of stroke experts from 18 different countries came to the conclusion that people with acute ischemic stroke and COVID-19 may have different risk factors, symptoms, responses to treatment, and outcomes. The panel suggested that more research be done to find out more about these possible differences. The goal of this study was to do an analysis on a large group of COVID-19 participants and then analyze them. This was done so that risk factors, comorbidities, treatment options, and outcomes for stroke patients could be found.

METHODOLOGY

The Healthcare information technology system deidentified COVID-19 dataset was utilized in this retrospective cohort study. This dataset is a subset derived from electronic medical records at health care facilities that have a data usage agreement with EMR/HIS. ^{17,18} This dataset was developed using a proprietary process that is detailed in another article. By April 2021, data from E-patient encounters will be used. Data on regions and hospitals are omitted from the collection as part of the de-identification process. Because the data analysed were deidentified medical interactions, this study did not require institutional review board permission. It contains information about EMR patients who match the following requirements for inclusion:

- At least one contact in an emergency department or hospital environment revealed COVID-19 exposure or clinical concern.
- The patient has had a positive COVID-19 laboratory test at least once while in the ER or hospital.

COVID-2020Q2apr data were gathered from 5 Real-World Data health systems. The study enrolled COVID-19-infected patients as well as those who were only suspected of having the condition. Patients' admission and discharge status as well as demographic information about the people they serve are only a few of the many data points contained inside the data. Patients' insurance coverage is also included in the data. Researchers used data from Pakistan's computerized medical records to categorize the country's population into urban and rural.

The Clinical Modification numbers were used to locate patients who had been taken to the hospital with an acute ischemic stroke. Conditions like diabetes, hypertension, nicotine addiction, high cholesterol, atrial fibrillation, and congestive heart failure were all coded using a range from to. Additionally, there are codes for acute renal damage, hepatic failure and cardiac arrest as well as respiratory failure, pneumonia and urinary tract infection. Using procedure codes and current procedural terminology codes, we were able to count the number of people who had thrombolytic treatment for an acute ischemic stroke. The administration of intraarterial thrombolytic treatment was also coded using procedure codes (for mechanical ventilation).

Only discharge destinations were considered in the final solution calculation. Discharge sites were classified as being either "home" or "somewhere else" by the researchers (acute rehabilitation, intermediate care or skilled nursing facility, or nursing home). Those who are taken to a facility other than their own house after a stroke have a greater chance of developing moderate to severe impairments in the three months following their recovery than those who are permitted to return home. We didn't include patients who had a history of health problems in our study because we wanted to make sure we covered all the bases.

Statistical Analysis: The demographic, clinical, and outcome features of patients in the COVID-19 study were the same regardless of whether or not they had an acute ischemic stroke. "Acute ischemic stroke" refers to a stroke that occurred within 72 hours of being admitted to the hospital for treatment with COVID-

19. This was the term used by doctors to characterize the situation (defined as discharge home, discharge to a location other than home, or death). There were no differences between patients with acute ischemic stroke who received COVID-19 therapy and those who did not. The results of the two-tailed and two-sample t tests showed no statistically significant differences between COVID-19 persons who had suffered an ischemic stroke and those who had never suffered such a complication. In order to account for the numerous comparisons, the Bonferroni correction was used. A p-value of 0.05 is often used when judging the relevance of anything.

All of the COVID-19 patients were examined using stepwise backward logistic regression after we adjusted for age, gender, rural/urban background, and blood pressure levels. After taking into consideration all of the variables, this was accomplished. Hyperlipidemia, atrial fibrillation, and congestive heart failure all need therapeutic alterations. The goal of this study was to see if the presence of the COVID-19 gene was linked to a higher risk of death in the hospital, a higher risk of being sent home from a location other than the patient's own house, or both. There was no evidence linking the two occurrences. Every step of the analysis was conducted using SPSS.

RESULTS

COVID-19 individuals who had an acute ischemic stroke were 8,163 (1.3 percent) of the overall sample of 27,676. Acute ischemic strokes occurred in 199 of the 19,513 people infected with COVID-19 who had no idea they were afflicted. A COVID-19 was found in 133 of the 103 patients who had both an acute ischemic stroke and a COVID-19. One hundred three patients experienced both a COVID-19 and an acute ischemic stroke, according to the study's findings.

Acute ischemic stroke patients had an average age of 68.8 years, compared to 54.4 years for controls in the Covid-19 study, which is a significant difference (P0.001). Those who had an acute ischemic stroke in the COVID-19 research were more likely to have hypertension, diabetes, high cholesterol levels, atrial fibrillation, and congestive heart failure than patients who did not have a stroke. Compared to persons who did not have an acute stroke, those who had cerebral embolism, intracerebral hemorrhage, and myocardial infarction had significantly greater rates of these conditions. This Those who experienced an acute

ischemic stroke in the COVID-19 study were more likely than those who hadn't to suffer from acute renal impairment, hepatic failure, or respiratory failure. Acute ischemic stroke patients have a higher incidence of these consequences. P0.0001. Pneumonia, lung embolisms, deep vein thrombosis and cardiac arrest occurred in about equal numbers in each of the groups.

More Sixty-one percent of COVID-19 patients who had an acute ischemic stroke and died in the hospital than at home (P 0.001) died in the hospital rather than at home (Table 2). Patients who experienced an acute ischemic stroke were shown to be considerably more likely to die or be admitted to a facility outside of their home, according to a multivariate model that included all COVID-19 participants (P 0.001).

There was no statistically significant difference between those who had COVID-19 and those who didn't in a study of people who had an acute ischemic stroke (68.8 vs. 71.0; P = 0.24). There was no change in the prevalence of illnesses including high blood pressure, diabetes, high cholesterol, and arrhythmias like atrial fibrillation, myocardial infarction, and congestive heart failure between individuals who received COVID-19 and those who did not. Because of taking COVID-19, patients with acute ischemic stroke and those without experienced similar levels of intracranial hematoma, deep vein thrombosis, and cardiac arrest (Table 1). They all had severe renal failure, liver failure, pneumonia or lung failure in both sets of patients COVID-19 recipients and non-COVID-19 recipients did not differ substantially when it came to the number of patients who had an acute ischemic stroke and were treated with intravenous thrombolysis or mechanical thrombectomy, respectively.

Patients with an acute ischemic stroke were 19.4% less likely to die in the hospital when administered COVID-19 than those who weren't (21.6 percent). It was statistically significant that when COVID-19 was provided, 62.1% of people who had an acute ischemic stroke were transported away from home, compared to 48.2% (P = 0.02; Table 2). Patients with acute ischemic stroke had a significantly higher risk of death or being transferred to an unknown place when COVID-19 was included in the multivariate model (P = 0.03). If a patient had atrial fibrillation, it was more likely that he or she would die or be sent away from home (P = 0.014).

Table 1:

Demographics	Patients with COVID-19 and acute ischemic stroke (n=103)	Patients with COVID-19 but without any stroke (n=7606)	Patients with acute ischemic stroke without COVID-19 (n=199)
Age in (Mean± SD)	68.79±15.2	54.41±20.32	71.01±14.92
Age <35 years	2(1.89%)	1488(19.62%)	6(3.02%)
Age 35–55 years	17(16.52%)	2105(27.72%)	17(8.51%)
Age 56–70 years	32(31.11%)	2188(28.81%)	57(28.63%)
Age >70 years	52(50.52%)	1825(24.01%)	119(59.81%)
Males	46(44.71%)	3575(47.03%)	110(55.34%)
Hypertension	87(84.53%)	3662(48.22%)	165(82.95%)
Diabetes	58(56.32%)	2295(30.21%)	103(51.80%)
Smoking	11(10.70%)	650(8.62%)	39(19.62%)
Hyperlipidemia	78(75.70%)	2535(33.33%)	142(71.40%)
Atrial fibrillation	29(28.21%)	768(10.11%)	72(36.22%)
Congestive heart failure	34(33.02%)	969(12.70%)	72(36.22%)
Length of hospital Stay in days (Mean± SD)	10±7.9	7±6.1	9±7.2
Cerebral edema	4(3.90%)	27(0.41%)	5(2.55%)
Pneumonia	58(56.33%)	3424(45.01%)	109(54.80%)
Deep venous thrombosis	7(6.84%)	284(3.73%)	22(11.12%)
Pulmonary embolism	4(3.98%)	173(2.33%)	5(2.53%)
Intubation/mechanical ventilation	7(6.82%)	265(3.54%)	25(12.65%)
Urinary tract infection	29(28.22%)	1349(17.73%)	59(29.72%)
Acute kidney injury	52(50.51%)	1737(22.80%)	95(47.79%)
Hepatic failure	4(3.91%)	94(1.22%)	6(3.00%)
Cardiac arrest	4(3.91%)	117(1.52%)	10(5.01%)
Acute myocardial infarction	11(10.75%)	347(4.64%)	36(18.11%)
Intracerebral hemorrhage	2(1.90%)	0(0%)	6(3.02%)
Systemic inflammatory response syndrome	2(1.90%)	113(1.55%)	4(2.01%)
Septic shock	37(35.91%)	1338(17.63%)	81(40.72%)
Respiratory failure	54(52.43%)	2249(29.65%)	99(49.80%)

Table 2:

Variables	Patients with COVID-19 and acute ischemic stroke (n=103)	Patients with COVID-19 but without any stroke (n=7606)	Patients with acute ischemic stroke without COVID-19 (n=199)
Discharge home	19(18.51%)	4939(64.90%)	60(30.22%)
Discharge to destination other than home	64(62.10%)	2215(29.11%)	96(48.23%)
In-hospital death	20(19.44%)	474(6.22%)	43(21.64%)

DISCUSSION

More than 100 people in a clinical trial of COVID-19 developed an acute ischemic stroke, which is the most common type of stroke. Acute ischemic stroke patients who had COVID-19 were older, more likely to be black, and more likely to have health conditions such as hypertension, diabetes, high cholesterol, atrial fibrillation, and congestive heart failure than patients who did not have COVID-19. More women than men have COVID-19, according to the research. Acute ischemic stroke patients in COVID-19 were more likely to have cardiovascular events than those who did not have one. Evidence of an internal hemorrhage, known as ICH and myocardial infarction, was also found (MI).

If a patient had COVID-19 and an acute ischemic stroke, he or she was more likely to suffer acute renal impairment, hepatic failure, or respiratory failure. There was no elevated risk for any of these problems in patients who had COVID-19 in isolation. Acute ischemic stroke victims infected with COVID-19 died earlier and required longer hospitalization than those without the virus. People who had an acute ischemic stroke were more likely to be hospitalized or die than those who had a non-ischemic stroke. Even after taking into account possible confounding circumstances, this was the case. In terms of baseline and clinical features, COVID-19 patients differed from those without it. In comparison to those who did not receive the Covid-19 vaccine, those who received the vaccine had a greater post-hospital mortality rate. Patients with ischemic stroke who had COVID-19 in their blood had a 1.2-fold increased risk of dying outside of the hospital than they would have otherwise. Key elements that could have generated confusion were not a factor in the outcome of this study

Acute ischemic strokes occurred in a small number of COVID-19 participants (1.3 percent). COVID-19 deficiency raises the risk of ischemic stroke by one percent, according to the results of our study. Participants in the COVID-19 study experienced a higher incidence of acute ischemic stroke than predicted. According to a research published in JAMA, people with COVID-19 who take standard anticoagulant medication may have a 1-3% higher risk of having an acute stroke. Acute ischemic strokes occurred in 9 percent of the 3556 COVID-19 participants hospitalized in one study¹⁶. 1 in every 1916 patients admitted to the hospital or emergency room because to COVID-19 experienced an acute ischemic stroke, according to a recent study². Acute ischemic stroke patients and those who did not have the illness shared the same risk factors for coronary artery disease, small vessel disease and cardioembolism, according to our findings. Although patients with COVID-19 acute ischemic stroke are often younger and have no risk factors for heart disease, our results may contradict those of smaller case studies. Stroke victims are more likely to suffer an acute ischemic stroke if they have additional heart disease risk factors, such as COVID 19. (16,22,23). The findings of numerous other studies (7,13,15), on the other hand, corroborate ours. Atherial fibrillation and elevated blood pressure were far more common in people who had the COVID-19 virus than in those who had the influenza virus.

Acute ischemic stroke patients with COVID-19 have a greater chance of being hospitalized or dying as a result of their illness. Stroke victims who had COVID-19 antigen testing positive were more likely to have problems with various systems compared to those who did not have both disorders. Another study found that patients with COVID-19 who did not have a stroke were less likely to die in the hospital and more likely to be discharged to a location other than their home. Additional inquiry is required. Covid-19-vaccinated individuals were more likely to be moved to a new site

than those who did not receive the vaccine for acute stroke. Covid-19 appears to have had an impact on their outcomes. Covid-19 causes a wide range of systemic symptoms in those who are infected, as was previously mentioned. As a result of one or more of these conditions, patients who have had an acute ischemic stroke are more likely to die or become disabled. Mechanical thrombectomy has a lower success rate in patients with COVID-19 and acute ischemic stroke, according to the study's conclusions. Both patients with and without COVID-19 had similar rates of thrombolysis and mechanical thrombectomy.

After an acute ischemic stroke, COVID-19 was identified in the blood of the vast majority of patients. Acute ischemic stroke can happen to anyone, even if they don't have COVID-19. However, this is not always the case, as should be obvious. For patients who have suffered an acute stroke, laboratory testing are unlikely to be able to confirm or rule out the existence of COVID-19 during the earliest stages of diagnosis and therapy planning. COVID-19 should be examined in people who have had an acute ischemic stroke and are suspected of having the disease. COVID-19 Acute ischemic stroke patients face an increased risk of death or hospitalization, and treatment for an acute stroke is unlikely to lower this risk. The optimal way to care for those who have suffered an acute ischemic stroke may be determined by assessing the level of dysfunction in various organs when additional COVID-19-related disorders are taken into account. Intravenous thrombolysis and mechanical thrombectomy were used less frequently in patients who had a sudden ischemic stroke. Some patients may have had to wait longer at angiographic facilities or emergency rooms as a result of these delays. As a result of this, there has been an improvement in COVID-19 diagnosis procedures and a decrease in the disease's spread. 25,26

CONCLUSION

Acute ischemic stroke occurs relatively seldom when on the COVID-19 protocol and is almost always accompanied by additional symptoms of increased cardiovascular risk. COVID-19 carriers had a twofold increased risk of being hospitalised or dying in the event of an acute ischemic stroke. This study discovered that individuals who suffered an acute ischemic stroke and tested positive for COVID-19 had a greater risk of being transferred to a different facility or dying of unexplained causes.

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